

Bellwork: 2/28/13

Find all the roots of the polynomial function:

$$f(x) = x^3 - 2x^2 - 16x + 32$$

maximum # of roots: 3

possible rational roots: $\pm 1 \pm 2 \pm 4 \pm 8 \pm 16 \pm 32$

factored form: $(x-2)(x+4)(x-4)$

roots: 2, -4, 4

$$\begin{array}{r|rrrr} 2 & 1 & -2 & -16 & 32 \\ & & 2 & 0 & -32 \\ \hline & 1 & 0 & -16 & 0 \end{array}$$

$$\begin{array}{l} x^2 - 16 \\ (x+4)(x-4) \end{array}$$

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Find all actual zeros of $f(x)$.

1) $f(x) = x^3 + x^2 - 4x - 4$

Maximum # of roots: _____

Possible rational roots: _____

Factored form: _____

Actual roots: _____

Work:

2) $f(x) = -4x^3 + 15x^2 - 8x - 3$

Maximum # of roots: _____

Possible rational roots: _____

Factored form: _____

Actual roots: _____

Work:

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3) $f(x) = \textcircled{-3}x^3 + 20x^2 - 36x + \textcircled{16}$ $\begin{array}{r} 1 \ 2 \ 4 \ 8 \ 16 \\ 1 \ 3 \end{array}$

Maximum # of roots: _____

Possible rational roots: $\pm 1 \pm 2 \pm 4 \pm 8 \pm 16 \pm \frac{1}{3} \pm \frac{2}{3} \pm \frac{4}{3} \pm \frac{8}{3} \pm \frac{16}{3}$

Factored form: _____

Actual roots: _____

Work:

4) $f(x) = 4x^3 - 12x^2 - x + 15$

Maximum # of roots: _____

Possible rational roots: _____

Factored form: $(x+1)(2x-3)(2x-5)$

Actual roots: $-1, \frac{3}{2}, \frac{5}{2}$ 60

Work:

$$\begin{array}{r} -1 \overline{) 4 \ -12 \ -1 \ 15} \\ \underline{4 \ -16 \ 15 \ 10} \end{array} \quad \begin{array}{l} 4x^3 - 12x^2 + 15 \\ (4x^2 - 10x)(x+1) \\ 2x(2x-5) - 3(2x-5) \end{array}$$

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5) $f(x) = \textcircled{4}x^4 - 17x^2 + \textcircled{4}$ $\begin{array}{r} 1 \ 2 \ 4 \\ 1 \ 2 \ 4 \end{array}$

Maximum # of roots: 4

Possible rational roots: $\pm 1 \pm 2 \pm 4 \pm \frac{1}{2} \pm \frac{1}{4}$

Factored form: $(x-2)(x+2)(2x+1)(2x-1)$

Actual roots: $2, -2, -\frac{1}{2}, \frac{1}{2}$

Work:

$$\begin{array}{r} 2 \overline{) 4 \ 0 \ -17 \ 0 \ 4} \\ \underline{4 \ 8 \ 16 \ -2 \ -4} \\ -2 \overline{) 4 \ 8 \ -1 \ -3 \ 10} \\ \underline{4 \ 8 \ -1 \ -3 \ 10} \end{array} \quad \begin{array}{l} 4x^4 - 1 \\ (2x+1)(2x-1) \\ 2x+1=0 \quad 2x-1=0 \end{array}$$

6) $f(x) = 2x^3 - 11x^2 + 12x + 9$ $\begin{array}{r} 1 \ 3 \ 9 \\ 1 \ 2 \end{array}$

Maximum # of roots: 3

Possible rational roots: $\pm 1 \pm \frac{1}{2} \pm 3 \pm \frac{3}{2} \pm 9 \pm \frac{9}{2}$

Factored form: $(x-3)(2x+1)(x-3)$

Actual roots: $3, 3, -\frac{1}{2}$ -6

Work:

$$\begin{array}{r} 3 \overline{) 2 \ -11 \ 12 \ 9} \\ \underline{2 \ -6 \ 15 \ -9} \\ 2 \ -5 \ -3 \ 10 \end{array} \quad \begin{array}{l} 2x^3 - 5x^2 - 3 \\ (2x^2 - 6x)(x-3) \\ 2x(x-3) + 1(x-3) \end{array}$$

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